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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/660,386	09/12/2000	Vladislav Vashchenko	NSC1-H1200	6925

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EXAMINER
NADAV, ORI

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 05/01/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/660,386	VASHCHENKO ET AL.	
	Examiner	Art Unit	
	ori nadav	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 March 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

2. Claims 1-4 and 8-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Oh (5,986,863).

Regarding claim 1, Oh teaches in figure 4 an ESD protection structure for use with an integrated circuit comprising a semiconductor substrate 10 of a first conductivity type P having a top surface, a first well region 30 of a second conductivity type N disposed in the semiconductor substrate and having a center region, a side wall surface that contacts the top surface, and a bottom surface that contacts the side wall surface, the bottom surface under the center region contacting the substrate, a second well region 20 of the second conductivity type disposed in the semiconductor, a gap region 40 of the first conductivity type disposed in the semiconductor substrate and separating the first well region from the second well region, a first floating region 36 of the second

conductivity type disposed in the first well region adjacent to the gap region; a second floating region 26 of the second conductivity type disposed in the second well region adjacent to the gap region, a first contact region 32 of the first conductivity type disposed in the second region of the first well region and spaced apart from the first floating region, a second contact region 22 of the first conductivity type disposed in the second well region and spaced apart from the second floating region, a first contact region 34 of the second conductivity type disposed in the center region of the first well region and spaced apart from the first floating region, a second contact region 24 of the second conductivity type disposed in the second well region and spaced apart from the second floating region.

Although Oh does not explicitly state that regions 26 and 36 are floating regions, regions 26 and 36 are not connected to external pads (figure 4). Therefore, regions 26 and 36 are held to be floating regions.

Regarding the claimed limitation of a bottom surface of the first well region contacting the substrate under the center region, Oh teaches a bottom surface of the first well region contacting the substrate under the center region, for the following reasons. First, the first well region is formed in the substrate, which means that the bottom surface of a first well region is also formed and located in the substrate. An element which is formed within a second element must contact the second element. Therefore, the bottom surface of the first well region of Oh's device contacts the substrate under

the center region, as claimed. Second, office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. See, e.g., In re Zletz, 893 F.2d 319, 321 - 22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) ("During patent examination the pending claims must be interpreted as broadly as their terms reasonably allow . ."). The term "under" is interpreted as "below" or "beneath". The bottom surface of a first well region contacts the substrate at a location which is vertically below or beneath the center region. Therefore, Oh teaches the bottom surface of a first well region contacting the substrate under the center region, as claimed. Third, the center region can include most of the first well region, and terminates just before reaching the side wall surface. Figure 4 of Oh depicts that the bottom surface of a first well region contacts the substrate before the side wall surface. Therefore, Oh teaches the bottom surface of a first well region contacting the substrate under the center region, as claimed.

Regarding claim 2, Oh teaches a first electrical contact 5 connected to the first contact region of the first conductivity type 32, the first contact region of the second conductivity type 34 (a first diode), and the integrated-circuit (column 5, lines 14-16), and a second electrical contact Vcc1 connected to the second contact region of the first conductivity type 22, the second contact region of the second conductivity type 24 (a

second diode) and to ground (column 1, lines 26-29). Note that the device would not operate in its intended use if not connected to ground and to an integrated circuit.

Regarding claims 4 and 11, Oh teaches in figure 4, the dopant concentrations of the first floating region and the second floating region are greater than the dopant concentrations of the first well region and the second well region.

Regarding claim 8, Oh teaches in figure 4 first and second contact regions electrically connected to a first node Vcc2 (see e.g. figures 2 and 3 how first and second contact regions 32, 34 are electrically connected to a first node Vcc2).

Regarding claim 12, Oh teaches in figure 4, the dopant concentrations of the first and second trigger regions are greater than the dopant concentrations of the first well region and the second well region, respectively

Regarding claims 13 and 14, the claimed limitations of first and fourth potentials on the first node are greater than second and third potentials on the second node during first and second ESD events, respectively, are inherent in Oh's device, because Oh's structure is identical to the claimed structure.

3. Claims 8 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Leach (5,640,299).

Leach teaches in figure 18 a device comprising a semiconductor substrate of a first conductivity type P having a top surface, a first well region 133 of a second conductivity type N disposed in the semiconductor substrate, a second well region 131 of the second conductivity type disposed in the semiconductor, a gap region of the first conductivity type disposed in the semiconductor substrate and separating the first well region from the second well region, a first contact region 149 of the first conductivity type disposed in the first well region and electrically connected to a first node, a second contact region 147 of the second conductivity type disposed in the second well region and electrically connected to a first node, a first trigger region 151 of the second conductivity type disposed in the first well region and spaced apart from the first and second contact regions, a third contact region 143 of the first conductivity type disposed in the second well region and electrically connected to a second node, a fourth contact region 141 of the second conductivity type disposed in the second well region and electrically connected to the second node, a second trigger region 145 of the second conductivity type disposed in the second well region and spaced apart from the third and fourth contact regions, wherein the first trigger region 151 is spaced apart from the bottom surface of the first well.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oh (5,986,863).

Regarding claims 5-6, Oh teaches substantially the entire claimed structure, as applied to claims 1 and 4 above, except a dopant concentration of the first well region and the second well region to be at least 1E17 atoms per cm square and a gap region separating the first well region from the second well region with a minimum distance in the range of 0.18 microns to 0.25 microns

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a dopant concentration of the first well region and the second well region to be at least 1E17 atoms per cm square and a gap region separating the first well region from the second well region with a minimum distance in the range of 0.18 microns to 0.25 microns in Oh's device, since it is a matter of design choice within the skills of an artisan, subject to routine experimentation and optimization.

Response to Arguments

6. Applicant argues that Oh does not teach a bottom surface of the first well region contacting the substrate under the center region.

Oh teaches a bottom surface of the first well region contacting the substrate under the center region, for the following reasons. First, the first well region is formed in the substrate, which means that the bottom surface of a first well region is also formed and located in the substrate. An element which is formed within a second element must contact the second element. Therefore, the bottom surface of the first well region of Oh's device contacts the substrate under the center region, as claimed. Second, office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. See, e.g., In re Zletz, 893 F.2d 319, 321 - 22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) ("During patent examination the pending claims must be interpreted as broadly as their terms reasonably allow . ."). The term "under" is interpreted as "below" or "beneath". The bottom surface of a first well region contacts the substrate at a location which is vertically below or beneath the center region. Therefore, Oh teaches the bottom surface of a first well region contacting the substrate under the center region, as claimed. Third, the center region can include most of the first well region, and termainate just before reaching the side wall surface. Figure 4 of Oh depicts that the bottom surface of a first well region contacts the substrate before

the side wall surface. Therefore, Oh teaches the bottom surface of a first well region contacting the substrate under the center region, as claimed.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Papers related to this application may be submitted to Technology center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC

2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722 and 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.

Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to *Examiner Nadav* whose telephone number is **(703) 308-8138**. The Examiner is in the Office generally between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas, can be reached at **(703) 308-2772.**

Any inquiry of a general nature or relating to the status of this application should be directed to the **Technology Center Receptionists** whose telephone number is **308-0956**

Ori Nadav

April 25, 2002

Steven Loke
Primary Examiner